POLLEY LANE BRIDGE
(Yellow River Bridge)
Spanning Yellow River at Polley Lane
Town of Aurora
Taylor County
Wisconsin

HAER No. WI-15

HAER
WIS
60-AURA
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
Department of the Interior
P.O. Box 25287
Denver, Colorado 80225-0287

HISTORIC AMERICAN ENGINEERING RECORD
POLLEY LANE BRIDGE
(Yellow River Bridge)

HAER No. WI-15

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Location:	The bridge carried Polley Lane over the Yellow River in the Town of Aurora, Taylor County, Wisconsin, prior to its demolition in 1987.
UTM:	A (northwest end): 15:668720:5000660 B (southeast end): 15:668740:5000630
Quad:	Gilman, Wisconsin
Date of Construction:	1908
Fabricator:	Hennepin Bridge Company; Lawrence Henry Johnson, president
Present Owner:	None
Present Use:	Demolished
Significance:	The Polley Lane Bridge is representative of Pratt overhead trusses built between 1895 and 1910. These bridges are a transitional group, between the wagon bridge of the mid-to-late nineteenth century and the automobile-carrying structure of the twentieth century. Thus, the Polley Lane Bridge has pin connections for the major joints, light and slender members in the truss web, and a wood deck. The structural material was steel, however, and the floor beams were rolled sections. The bridge's 110-foot span is in the average range for similar overhead Pratt trusses in Wisconsin.
Project Information:	The Polley Lane Bridge was documented by Ayres and Associates, Eau Claire, Wisconsin for the Town of Aurora in accordance with the Memorandum of Agreement as a mitigative measure prior to the demolition of the bridge. Robert Newbery, Wisconsin Department of Transportation, served as Historian. Amy Ross, Mead & Hunt, Inc., assisted in the preparation of this report.

Historical Background

Though Wisconsin became a state in 1848, it was not until 1854 that the U.S. government sent surveyors to make a plat of present day Taylor County and the rest of the northern part of the state, according to the Jefferson plan.[1] This was some of the later land in the state to be settled. On March 4, 1875, the state legislature created Taylor County out of territory taken from Clark, Chippewa, Marathon and Lincoln Counties.[2] With an area of 986 square miles, the county is seven townships long and four wide, except for one lacking in the southeast corner. By a provision of the act creating Taylor County, the village of Medford was established as the county seat.

Prior to the permanent European settlement of north-central Wisconsin, two-thirds of this part of the state was covered with a dense growth of timber. Woodsmen, not settlers, were the first Europeans to come to northern Wisconsin, drawn by the area's extensive stands of white pine. After the pine had been substantially harvested in Clark County, logging companies, chiefly from Lacrosse, sent their crews still farther up the Black River Valley to cut the Taylor County pine and float the logs down to their mills to be sawed. By the turn of the century, the demand of the American consumer for wood products and the wasteful practices of Wisconsin lumbering operations had nearly exhausted the region's white pine reserves. In 1923, for the first time the quantity of hardwood cut exceeded that of soft wood.[3]

Early Taylor County industry revolved around logging. Several sawmill companies were established in the county seat of Medford in the latter quarter of the nineteenth century.[4] Two villages, Gilman and Polley, were established in the Town of Aurora in the first decade of the twentieth century,

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[1] Arthur J. Latton, Reminiscences and Anecdotes of Early Taylor County, Collection of Medford Public Library (n. p., 1947) 9.

[2] The Town of Aurora is located in former Clark County; see Map of Chippewa County, drawn by Capt. O.R. Dahl (Milwaukee, 1873).

[3] Latton 159.

[4] Historical Album: Medford Area, 1874-1974 Centennial (Medford, Wisc.: n. p., 1974) n. pag. Standard Atlas of Taylor County, Wisconsin (Chicago: Geo. A. Ogle & Co., 1913) shows three principal commercial operations in Medford: Union Tannery Co., Medford Lumber Co. and Medford Excelsior Co.

shortly after the railroad reached this point in Taylor County.[5] Like Medford, they were founded to serve the lumbering industry. By 1910, the population of Gilman was 150, and the town had three general stores, a hotel, grocers, hardware store, and woodenware manufacturers.

Polley, the nearest town to the Polley Lane Bridge, is described only as a country post office in 1910.[6] However, Polley was a growing community that two years later could boast of a population of 200, a depot on the Soo Line, a telephone, and a general store and hotel. Polley was named for two early entrepreneurs who settled here—James Polley, the postmaster and a real estate agent, and Charles Polley, a surveyor and timber estimator.[7] However, by the late 1920s, Polley's population was declining, while the town of Gilman, one-and-a-half miles to the northeast, was continuing to grow.[8]

In the nineteenth century, there were very few roads in Taylor County, excepting some logging or "tote roads," which connected logging camps to the outer world.[9] The western part of the county, which had only a small, scattered population at this time, was particularly isolated.[10] To get to the Little School in the Town of Aurora (just west of the later Polley Lane Bridge), horse-drawn vehicles had to travel 72 miles through Abbotsford to Boyd, and then up the Yellow River Road.[11]

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[5] Map of Taylor County, Wisconsin (Milwaukee: Bogk & Rowland, [1900?]). This map, which indicates Taylor County farm and timber lands, shows the railroad extending only as far north as the township immediately south of Aurora. In the 1909-10 business directory, Gilman is identified as a town on the Stanley, Merrill & Phillips railroad; see Wisconsin State Gazetteer and Business Directory, 1909-10 (Chicago and Detroit: R.L. Polk & Co.). This line was a short segment that ran from Stanley to Jump River. By 1913, the Minneapolis, St. Paul and Sault Ste. (Soo Line) runs through Gilman as well. The two railroads bisected in the town of Polley. At this time, both Gilman and Polley have railroad depots; see Standard Atlas of Taylor County, Wisconsin.

[6] Wisconsin State Gazetteer and Business Directory, 1909-10.

[7] Wisconsin State Gazetteer and Business Directory, 1913-14.

[8] In the 1919-20 business directory, Polley is listed as having 250 residents and Gilman, 500. In 1924-25, Polley still has 250, while Gilman has 525 residents. By 1927-28, Polley's population has dropped to 100 and Gilman still stands at 525; see Wisconsin State Gazetteer and Business Directory.

[9] Latton 35. A manuscript logging map, Map of Taylor County, Wisconsin and Price County, Wisconsin (n.d.), apparently from the 1890s, indicates a logging road through this western portion of Taylor County that runs north of the Yellow River.

[10] An 1887 map, Map of Taylor County, Wisconsin, shows population concentrated around the Wisconsin Central Railroad Company line, which ran north-south through Medford in the center of the county.

[11] Latton 116. This road, in line with the later Polley Lane, ended in the middle of Section 29, Town 31 North, Range 4 West. The road and school are indicated on the manuscript logging map, Map of Taylor County, Wisconsin and Price County, Wisconsin; as well as on the c. 1888 Taylor County Map (Milwaukee: Frederick C. Bogk, [1888?]). This latter map has notes attached which record one logger's tracking of the development of the

Taylor County residents, like people throughout rural Wisconsin, remained reluctant to spend money on roadways throughout the nineteenth century. In 1901, after a decade long campaign for new roads led mainly by urban merchants and businessmen, the state legislature authorized the creation of a Good Roads Commission. This Commission was charged with determining the need for improved country roads throughout the state.[12] In 1903, the group recommended a constitutional amendment to permit state aid for roads. Though the law mandating state aid did not pass until 1911, in the intervening years local road construction began to boom—spurred by the convincing arguments and advertising campaign of the many supporters of this legislation. In these same years, the automobile was making its debut in Wisconsin.[13] Although the Good Roads Movement had already won support, the rise in the popularity of the automobile through the first decade of the twentieth century accelerated the construction of new roadways.

In the Town of Aurora, several new roads were completed by 1910. In 1908, the completion of two bridges allowed Polley Lane to be continued easterly from the Little Scbool to connect with Highway B.[14] County Highway B, a north-south artery, was extended to Gilman when a Yellow River crossing was provided in 1909. In 1910, the first state highway througb this part of Taylor County was constructed.

In 1907, the Town of Aurora petitioned the county for $1,325, one half of the estimated cost of $2,650, to construct a bridge across the Yellow River in Section 27, Town 31 North, Range 4 West.[15] County Board Proceedings from this year indicated that the town bad let a contract with the Hennepin Bridge Company of Minneapolis (L.H. Johnson, president) to construct a 110-foot span at this site.[16] On February 25, 1908, the Polley Lane Bridge, an overhead Pratt truss, was reported as having been fully constructed to the town's satisfaction.[17] The county also authorized a shorter span, also in line with Polley Lane, in that year. The two bridges provided for a through east-west

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railroad through 1902. The railroad is not yet to the Town of Aurora.

[12] Ballard Campbell, "The Good Roads Movement in Wisconsin, 1890-1911," Wisconsin Magazine of History 49.4 (1966): 283.

[13] Campbell 287-91. The first automobile was brought to Medford in the fall of 1902 by Henry and Herman Wesle; see Latton 122.

[14] These roads followed close upon the heels of the completion of the railroad north to this point. To trace development of road and rail system see: Map of Taylor County, Wisconsin [1900?]; Sectional Map of Chippewa, Clark, Taylor and Rusk Counties, Wisconsin (John S. Owen Lumber Co., [1910]); and Standard Atlas of Taylor County (1913).

[15] Taylor County Board Proceedings, 1907 (Taylor County, Wisconsin) 4-5.

[16] Taylor County Board Proceedings, 1907 79-80.

[17] Taylor County Board Proceedings, 1908 16.

route on wbat became known as Polley Lane.[18] Completed in 1908, this road served traffic travelling east from Chippewa County into Taylor County until Highway 64 was completed a couple of years later.

In 1909, the Town of Aurora voted to construct a bridge across the Yellow River in Section 24, Town 31 North, Range 4 West. This north-south oriented bridge would complete Highway B into the town of Gilman. A contract was let to Wisconsin Bridge and Iron Company in mid-August 1909 for a sum of $1,800.[19] The bridge, also a Pratt overhead truss, still stands at this site in the city of Gilman. However, Highway B traffic has been redirected to a new crossing and this bridge, now located in the Boyscout campground, is closed to vehicular traffic.[20]

The demand for a major roadway to connect the eastern and western parts of Taylor County bad grown strong by 1910, and the County Board finally responded by appointing E. L. Urquhart, John Gamper and Theodore Engstrand to make plans for a new road. The result of this committee's efforts was State Highway 64, wbich connected the cities of Medford, Gilman and Cornell and passed about a mile-and-a-half north of Polley.[21]

The Pratt truss was one of the two predominant truss types constructed in Wisconsin, as well as in the United States, in the late nineteenth century.[22] The Pratt truss was patented by Thomas and Caleb Pratt in 1844, but did not gain popularity in the United States until late in the nineteenth century. The range of span lengths for a Pratt overbead truss is 60 to 160 feet; in Wisconsin, they are generally from 90 to 110 feet in length.

Early and late Pratt overbead trusses are distinguishable through some visually obvious differences. In pre-1895 Pratts, the beams are built up from plates and angles, and the outside bottom corners of the floor beams are sometimes clipped. The deck is made of wood planks. The joints are pin-connected, and the tension members and the top lateral strut are bars or rods.

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[18] This second bridge in the Town of Aurora, described as along the E and W 1/4 line of Section 25, T31N, R4W, crossed Hay Creek. Its 60-foot span was erected by the Hennepin Bridge Company for a cost of $1,200. See Taylor County Board Proceedings, 1907 4-5, 79-80. The same Proceedings describe the Polley Lane Bridge as on the E and W 1/4 line of Section 27, T31N, R4W.

[19] Taylor County Board Proceedings, 1909 14, 30.

[20] Phone interview with Gilman Public Works Department, 28 May 1993.

[21] Latton 135. The Sectional Map [1910] indicates a road in the location of Highway 64, as well as Polley Lane. By 1910, the population of the county was 13,641, and that of the Town of Aurora was 583; see Latton 135.

[22] The other was the Warren truss; see Robert Newbery and H.W. Guy Meyer, "Ordinary Iron Highway Bridges," Wisconsin Academy Review (March 1983): 34-37.

From 1895 to 1910, the floor beams were rolled sections and the top lateral struts were deep and sometimes augmented by knee bracing. The hip verticals tended to be more substantial. Some bridges in this category used a more substantial bottom chord, such as channel beams; others continued to use rather light loop welded eye bars. The metal used in truss bridges built during this period was usually steel, whereas pre-1895 Pratt trusses were wrought-iron. The Polley Lane Bridge, erected in 1908, shared these structural characteristics with other Pratt overhead trusses built between 1895-1910.

Standardized bridge plans were adopted by the State Highway Commission (SHC) in 1914, and specified two types of trusses: Warren pony trusses and Pratt overhead trusses.[23] For longer spans, SHC specifications called for the Pratt overhead truss, which subsequently became the prevalent type. In the mid-1930s the SHC made a sudden, and unexplained, switch from the Pratt and its variations—including the Parker, Pennsylvania and Camelback trusses—to the Warren for overhead trusses. Only one SHC designed Pratt built after 1936 has been discovered. Almost all of the overhead trusses built after 1936 are standard SHC plans of the Warren design.

Pins were used as connections for the joints into the early twentieth century. During the dozen or so years surrounding the turn of the century, there was a debate over the merits of pin-connections versus riveted (or rigid) connections for the main members, i.e. the batter posts and other web members to the top and bottom chords.

Proponents of riveted bridges usually cited the increased rigidity and avoidance of damaging vibration as benefits of this method. Vibrations in pin-connected bridges caused the pin to grind on the eye bar and enlarge the pin hole. According to one observer, some bridges had to be replaced on that account alone. Advocates of pin-connected bridges, on the other hand, emphasized the theoretically correct distribution of stresses and the small amount of metal required as superior qualities of this type of connection. They also criticized the riveted joint for the difficulty in insuring that it was properly fabricated, especially in the field. The pin-connected bridge, they argued, was what had enabled Americans to surpass the rest of the world in bridge building.[24]

The issue of the superiority of pin versus riveted connections was complicated by practical factors, including machinery, tools, and power sources available both in the shop and in the field. Designs of both of these types of connections historically incorporated features which were not inherently part of the design. Some engineers denied that the pin *per se* was the most important feature of "characteristically American" bridgework, as had been claimed. Many riveted spans used the lattice-girder (or multiple triangulation) design which was clearly excessive in material, while many of

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[23] A few examples can be found which diverged from this standard.

[24] James A.L. Waddell, Economics of Bridgework (New York: J. Wiley & Sons, Inc., 1921) 73-74; Alfred P. Boller, Practical Treatise on the Construction of Iron Highway Bridges (New York: J. Wiley & Sons, Inc., 1876) 44-49; "Discussion on American Railroad Bridges," American Society of Civil Engineers, Transactions No. 429, 21 (Dec. 1889): 593.

the pin-connected bridges were dangerously light, particularly in their details. Given that each method had strong and adamant advocates, a fair comparison of the two connections was not always made.[25]

According to James A. L. Waddell, the debate over riveted and pin-connected bridges raged in engineering circles for many years around the turn of the century. No dramatic resolution of the issue occurred, but "time and steady development of the real science of bridge designing" gradually changed minds. A compromise of sorts, in which the best features of each design were adapted, finally settled the issue. In 1900, Engineering Record noted that the truss bridge that had evolved out of the debate had "a combination of the best features," and described it as having "pin truss members with riveted connections."[26]

The distinction of pin-connected versus riveted connected makes perhaps the best single sub-category boundary for highway bridges in Wisconsin. The SHC drafted a standardized riveted overhead Pratt as early as 1911; and, by 1914, the SHC Standard Plans for overhead trusses, which were based on the Pratt design and its variations, were exclusively for riveted joints. The SHC's adoption of riveted connections coincides roughly with the advent of the automobile. The lighter, pin-connected trusses belonged to the wagon era; the heavier, riveted trusses to the automobile era. The Polley Lane Bridge used the compromise joint design described above.

Another important detail of all metal bridges is the expansion bearings. Because the metal can expand and contract with changes in temperatures, it is necessary to provide for this movement. The greatest difficulty in designing an expansion bearing is in providing for a bearing which will last. The simplest method is to provide two flat, smooth surfaces. A bolt or pin in a slotted hole provides the guidance and secures the bridge to the abutment. In Wisconsin, this method was limited to pony trusses, though in this type it was the predominant device. Unfortunately, the flat surfaces tended to corrode and this type of bearing did not prove durable.

Roller nests were the next development in expansion bearings. Early rollers were generally 1 to 2-inches in diameter. However, they proved susceptible to corrosion as the nest tended to collect dirt. The next development was the rocker, which in a sense was part of the arc of a very large roller. The SHC made the switch from roller nest to rockers in 1915.[27] The Polley Lane Bridge used a fixed plate bearing on one end, and a roller on the expansion end.

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[25] Waddell, Economics of Bridgework 72; Boller, Practical Treatise 44-49; "The Development of Bridge Trusses," Engineering Record 42.10 (1900): 411.

[26] "The Development of Bridge Trusses" 411.

[27] Barbara Wyatt, ed., Cultural Resource Management in Wisconsin: Volume 2 (Madison, Wisc.: State Historical Society of Wisconsin, 1986) Section 12.

Engineering Description

The Polley Lane Bridge, fabricated by the Hennepin Bridge Company, was similar to many Pratt trusses constructed between 1880 and 1910. Pratt overhead trusses of this period were typically of light and slender construction with pin-connected members. Those built before 1895 are distinguisbable in that they were generally built of wrought-iron, while the post-1895 bridges were steel. The truss at Polley Lane had a 110-foot span; a clear roadway width of 15.8 feet; and a vertical clearance of 13.2 feet to the overhead bracing.

Prior to its demolition, the bridge was located approximately 12 feet above the normal water elevation. As was typical for many such crossings, the road here dipped down a small hill, turned sharply to provide a transverse crossing, turned again and climbed the hill on the far side. The replacement bridge has flatter horizontal and vertical curves and provides a skewed crossing of the Yellow River.

The truss was constructed with both pin and riveted connections. It was supported on steel abutments by a fixed plate bearing on one end and a roller nest on the expansion end. The abutments were steel, and appeared to rest directly on the bedrock which is at the surface in this area. The floor system was a laminated wood deck supported on rolled steel stringers and floor beams. The top laterals were connected using knee braces.

The end posts and top chord were similar and consisted of two rolled channels with a top plate riveted to them. The compression verticals were two rolled channels connected with diagonal lacing bars and rivets. The hip verticals were double round bars that tied into short double channels which formed the pin-connection.

The main diagonals were steel flat or square bars, wbereas, the counter diagonals consisted of round bars. The bars were attached to the pin with looped welded ends. The counters were constructed with turn buckles built in for adjustment. The lower cbords were double bars, again loop welded at the ends. Appendix A shows the exact sizes of the main truss members.

As of September 1990, twenty Pratt overhead trusses survived from the period from 1890 to 1910. Approximately half of these bridges are older than the Polley Lane Bridge. Six of the twenty trusses bave a longer span than did Polley Lane, with the longest truss being the Chapin Road Bridge (1906) with its 140-foot span. One Pratt overhead truss from this period survives within the same township—the former Highway B bridge in Gilman, built in 1909. In all, there were approximately 60 known bridges of this type dating from this twenty-year interval, 1890-1910.

Lawrence Henry Johnson and the Hennepin Bridge Company

Lawrence Henry Johnson, founder of the Hennepin Bridge Company, came to the United States from Germany in 1875, at the age of 12. He attended school in Augusta, New York. In 1879, he moved with his family to Michigan where, the following year, he was appointed post office clerk at Greenville, Michigan. He moved to Minnesota in 1883 and joined the original Minneapolis Bridge Company where he was employed for about 5 years. He was later an agent for the Wrought Iron Bridge Company. In March 1890, he went into the business for himself, founding the Hennepin Bridge Company. The Hennepin Bridge Company was incorporated in 1905 with Johnson as president. Albert Nelson Marquis reported in his biographical sketch of Johnson that "the firm has been eminently successful in large undertakings," which he qualified by listing bridges built by the firm over the Mississippi River at both Hastings, Minnesota and Rice, Minnesota; and another built across the Yellowstone River, near Billings, Montana. Marquis also noted that Johnson was elected to the Minnesota Legislature in 1901, and later served as Speaker of the House of Representatives; and that Johnson was also a member of several fraternal organizations.[28]

[28] Albert Nelson Marquis, Book of Minnesotans (Chicago; A.N. Marquis Co., 1907) 265; and Fred L. Quivik, "Montana's Minnesota Bridge Builders," Industrial Archeology 10.1 (1984): 47.

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Fig. 1 USGS Quad: Gilman, Wisconsin (7.5 minute series)
A (northwest end): 15:668720:5000660
B (southeast end): 15:668740:5000630